Capital Restoration Projects: from Conception to Construction

Using the Carlin Levee Project as an Example

1 Phase 1: Watershed-Level Planning

Phase Elements	Who's Involved	Site Examples
• Meet with technical committees, policy groups and the public • Write conservation plan	• Project lead, (the lead agency on a project, for example King County) planners and ecologists • Community members	**Driving factors:** • Chinook recovery • Watershed health

Carlin Levee

2 Phase 2: Project Concept/Identification

Phase Elements	Who's Involved	Site Examples
• Visit potential project sites • Define project goal • Identify action(s) needed to achieve goal	• Community • Project lead ecologists • Project lead watershed planners (e.g. King County basin stewards)	Improving channel complexity and salmon rearing habitat on the Raging River included considering the following site locations: Preston Reach, Raging River Mouth and bridge-to-bridge reach in Fall City and upper Preston.

3 Phase 3: Feasibility

Phase Elements	Who's Involved	Site Examples
• Identify stakeholders and resources • Design project concepts • Estimate costs for design and construction • Confirm that objectives can be met • Evaluate potential project impacts	• Project lead staff (e.g. Capital Improvement Project staff, scientists, stewards) • Landowners	**KC considered the following questions:** • Will this project have an impact upstream or downstream or across stream properties? • Will it impact the road? • How will the channel respond to levee removal?

4 Phase 4: Review Options and Make Selection

Phase Elements	Who's Involved	Site Examples
• Review ecological elements (e.g. conduct topographical and geotechnical surveys, create current conditions map, monitor groundwater) • Assess real-life possibilities • Review cost-effectiveness	• Project lead staff (e.g. Capital Improvement Project staff, scientists, stewards) • Landowners	**Protecting the road behind the levee was a concern, so several solutions were considered:** • use a traditional riprap structure (e.g. put a lot of rock on the slope) • use boulders combined with large woody debris at the base of the slope • rely on the existing floodplain conditions

5 Phase 5: Design

Phase Elements	Who's Involved	Site Examples
• Pre-construction monitoring (e.g. habitat surveys, topographical surveys, geotechnical surveys, and hydraulic modeling) • Complete 90% of project design	• Biologists • Engineers • Geologists • Landowner	Calculating the size of boulders and the distance between rock clusters was done to provide the needed road protection.

6 Phase 6: Permitting

Phase Elements	Who's Involved	Site Examples
Conduct three to five individual and simultaneous permitting processes	Local, state and federal agencies that protect and manage resources. (See back for complete list.)	**Eight permits were required for the following:** • Clearing and grading • Dredging and filling • Endangered Species Act (ESA) compliance • Hydraulics approval • Environmental protection • Shoreline requirements • Water Quality Certification

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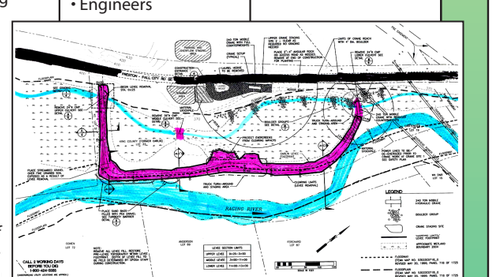
7 Phase 7: Final Design

Phase Elements	Who's Involved	Site Examples
• Incorporate changes from permitting process • Finalize design	• Biologists • Engineers	

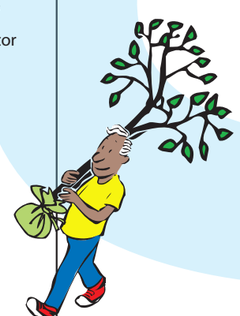


Thumbnail of the levee removal design

8 Phase 8: Construction

Phase Elements	Who's Involved	Site Examples
• Begin construction • Schedule project within "fish window"	• Project lead staff • Permitting staff • Private contractor	

A completed restoration project



9 Phase 9: Monitoring and Maintenance

Phase Elements	Who's Involved	Site Examples
• Actively monitor site for three to five years • Ongoing maintenance	• Project lead staff	• KC will be monitoring fish use at the project site, surveying the stream channel, and surveying the large woody debris that was used. • Maintenance will include noxious weed removal and follow-up planting projects.

Project maintenance

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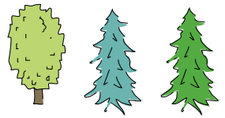

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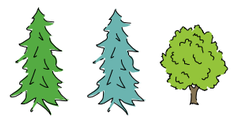
A Step-by-Step Look at a Complex Process



Phase 1:
Watershed–Level Planning

During Phase 1 of planning the lead agency identifies a primary goal that needs to be achieved (e.g. salmon recovery, flood reduction, watershed health issue, drainage issue) and then determines what must be done to achieve that goal (e.g. what type of projects or actions). To achieve salmon recovery, for example, Phase 1 analysis would determine the type of habitat that would provide the greatest increase in salmon productivity. During this phase, specific project information is limited. This phase is supported by the operating budget of the project lead and possibly support from other jurisdictions.

Timeline: about one to two years. Generally plans are relevant for ten years. Following that, updates should be made. **Cost:** determined by scope of issues and goals needing to be addressed.

Phase 2:
Project Concept/Identification

During this phase the general principles in Phase 1 are applied on a site specific basis. This phase requires significant familiarity with the natural resources of an area in an attempt to determine the best location for a project. Primary consideration is given to the benefit(s) the project will provide. Support for Phase 2 continues to come from an operating budget.

Timeline: emerging concepts should be considered on an ongoing basis with new priorities made annually. **Cost:** $5,000 annually per concept.

Phase 3:
Feasibility

During the feasibility phase of project development, specialists (e.g. engineers, geologists, hydrologists, ecologists) begin analyzing the following questions:

- Can the project be constructed?
- Will the project achieve the benefits predicted in Phase 2?
- Will there be project impacts?
- Do the impacts prevent construction or require mitigation?
- Is there support for the action?
- What is the cost of the project?

The specific goal of this phase is to make a decision about whether or not a project should be pursued. Granting agencies want many of these issues resolved before allocating funds to the project.

Feasibility studies are funded through the project lead's operating budget and money earmarked for Capital Improvement Projects (CIP) as well as grant funds.

Timeline: six months. **Cost:** $20,000 - $150,000, depending on scale and existing data.

Phase 4:
Review Options and Make Selection

Once a project concept has passed the feasibility phase, there are usually a variety of actions that can be taken to accomplish the project objectives. The design team must choose a specific set of actions from the range of potential activities within the project concept. At this point, substantial financial investments in the project are required (e.g. surveys, geotechnical study, etc.). Funding for Phases 4 through 8 comes from CIP budget and grant money.

Timeline: three to six months. **Cost:** $50,000 - $300,000.

Phase 5:
Design

The design phase is the development of the actual project plans for the specific suite of actions selected in Phase 4. While cost or unforeseen circumstances can require the design team to revisit options considered in Phase 4, for the most part the focus is on the details of the proposed actions. For example:

- How many feet of the levee will be removed?
- How much large woody debris is needed to accomplish the desired function?
- What plants should be used and where?

This phase facilitates the funding process by making it clear what will actually be funded. Biologists and engineers take in feedback throughout Phases 1 through 4 and then design a project that will meet the project team's ecological goals, landowner goals, and known permitting constraints. Design is only 90% complete to allow permitting agencies to make any needed adjustments.

Timeline: three months. **Cost:** $25,000 - $400,000.

Phase 6:
Permitting

Each project requires a variety of permits from local, state and federal agencies that protect and manage natural resources. Agencies typically involved are:

- WA Department of Fish and Wildlife
- WA Department of Natural Resources
- WA Department of Ecology
- King County Department of Development & Environmental Services
- US Fish & Wildlife Service (USFWS)
- National Oceanic & Atmospheric Administration (NOAA)
- Army Corps of Engineers

If the project is going to affect Chinook or bull trout, all the permitting agencies will consult with the NOAA, National Marine Fisheries Service, and USFWS to determine if there are any Endangered Species Act issues. Each permitting agency also has their list of requirements for which a project must be screened. Minor changes or conditions are commonly added to a project during the permitting phase.

Timeline: three months. **Cost:** $25,000 - $400,000.

Phase 7:
Final Design

The design is final at this phase and includes several elements. For example:

- a site map
- planting plan
- specific design element details (e.g. how deep to put large woody debris, what angle, etc.)
- required materials

Timeline: one to three months. **Cost:** $5,000 - $25,000.

Phase 8:
Construction

Construction usually includes upland (e.g. planting) and instream—work done in the water—elements. Instream work can only be done during specific times of the year based on when different fish species will not be present in the water during construction. This "fish window" ranges from two to three months, depending on the type of fish present. Permits, like clearing and grading, affect when upland activities can be done. Typical CIP in-stream construction is actually only done during a short period of time each year. Planting takes place between November and March.

Timeline: three to 15 months. **Cost:** $200,000 - $2 Million.

Phase 9.
Monitoring and Maintenance

Once a project is constructed there are several types of monitoring that are undertaken. The two that take place most often with CIPs are:

- Implementation monitoring–the process of determining if the planned activity occurred as planned. (Did we build what we said we would?)
- Direct effectiveness monitoring attempts to answer if the project is achieving the desired results or not and typically lasts between three and five years.

Maintenance issues are generally identified through site monitoring. Low native plant survival or invasive plant species coming in are two of the usual site maintenance activities that need to be done.

Funding for monitoring and maintenance comes from the project lead's CIP budget.

Timeline: three years+. **Cost:** $15,000 - $100,000.

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